



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS TX 75202-2733

FEB 24 2016

Bob Piniewski
Settling Defendants' Project Coordinator
Project Navigator, Ltd.
15990 N Barkers Landing Rd, Suite 325
Houston, Texas 77079

Re: Malone Service Company Superfund Site, Texas City, Texas – Malone Cooperating Parties
assume injection well operations

Dear Mr. Piniewski:

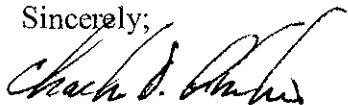
The Malone Service Company Superfund Site Explanation of Significant Differences (ESD), which allows the Environmental Protection Agency (EPA) Remedial Program and the Malone Cooperating Parties (MCP) continued use of the onsite injection wells, was final and effectively approved on February 5, 2016 – the end of the ESD comment period. A copy of the ESD is enclosed. The ESD is specific to the use of the two (2) onsite hazardous waste injection wells (WDW-138 and WDW-73) for the continued subsurface disposal of onsite contaminated storm water and groundwater during the ongoing EPA Superfund Remedial Action (RA) and portions of the Operations and Maintenance (O&M) of the Site through January 2019.

The 1990 EPA Underground Injection Control Program No-Migration Petition expired on June 16, 2015, and injection of storm water, except in emergency situations, ceased. During the period between June 16, 2015, and the ESD becoming final on February 5, 2016, the EPA Emergency Response Program assumed injection well operations from the MCP. The ESD is approved, therefore, along with EPA oversight, the MCP will resume operations of the two onsite hazardous waste injection wells. The wells are operated following the Texas Commission on Environmental Quality and EPA approved Storm Water Management Plan (SWMP) and Operations and Maintenance Plan (URS 2005a, URS 2005b; ENTACT Rev. No. 1 2014, & ARCADIS Addendum No. 2 2015) and in accordance to regulations cited within the ESD.

Due to the previously mentioned hazardous waste injection well No-Migration Petition expiration, several documents submitted by the MCP were approved by EPA in part because language in these documents was specific to injection well operations. However, with the ESD final, the EPA approves the Phase Two Remedial Design and Remedial Action Work Plan (ENTACT 2015), the SWMP Revision No. 1 (ENTACT 2014) and the SWMP Addendum No. 2 (ARCADIS 2015) in their entirety.

If you have any questions, please contact me at (214) 665-7188; or via email at – abshire.david@epa.gov.

Sincerely;

A handwritten signature in black ink, appearing to read "Charles D. Abshire", written in a cursive style.

Charles David Abshire
Remedial Project Manager
USEPA, Region 6

Enclosure

cc: Steven M. Jawetz, Common Counsel
Marilyn C. Long, P.G., TCEQ

EXPLANATION OF SIGNIFICANT DIFFERENCES FOR
THE
RECORD OF DECISION

MALONE SERVICE COMPANY,
(SWAN LAKE)
SUPERFUND SITE



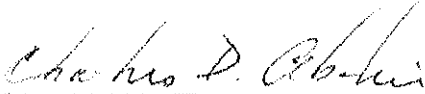
UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION 6
SUPERFUND DIVISION

December 2015

**Malone Service Company Superfund Site
Explanation of Significant Differences**

November 2015

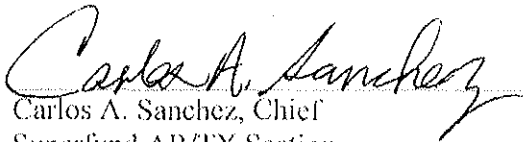
Concurrence List



Charles D. Abshire, Remedial Project Manager
Superfund AR/IX Section

10/29/15

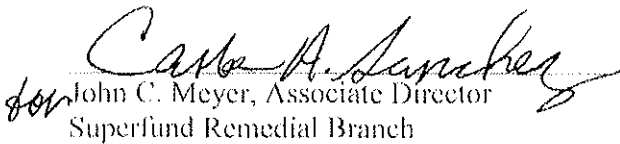
Date



Carlos A. Sanchez, Chief
Superfund AR/IX Section

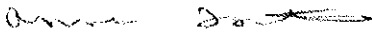
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Date


for John C. Meyer, Associate Director
Superfund Remedial Branch

10/29/15

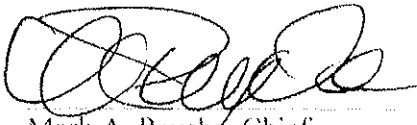
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Anne Foster, Site Attorney
Superfund Branch, Office of Regional Counsel

10/29/15

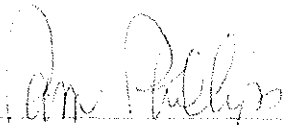
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Mark A. Peycke, Chief
Superfund Branch, Office of Regional Counsel

11/01/15

Date



Pamela Phillips, Deputy Director
Superfund Division

12/10/15

Date

**MALONE SERVICE COMPANY (SWAN LAKE) SUPERFUND SITE
EXPLANATION OF SIGNIFICANT DIFFERENCES
FOR THE RECORD OF DECISION**

I. INTRODUCTION

Site Name: Malone Service Company, (Swan Lake)
Site Location: Texas City, Galveston County, Texas
CERCLA ID No.: TXD980864789
Support Agency: Texas Commission on Environmental Quality (TCEQ)
Lead Agency: U.S. Environmental Protection Agency (EPA), Region 6

II. STATEMENT OF PURPOSE

This decision document presents the basis for the determination to issue the Explanation of Significant Differences (ESD) for the Malone Service Company (Swan Lake) Superfund Site (the Site) September 30, 2009 Record of Decision (ROD). The ESD determination was conducted in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), Section 117(c), 42 U.S.C. § 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and the National Oil and Hazardous Substances Contingency Plan (NCP), 40 C.F.R. § 300.435(c)(2)(i). The ESD will become part of the Administrative Record for the Site. The Director of the Superfund Division has been delegated the authority to sign this ESD.

This ESD is specific to the use of the two (2) onsite hazardous waste injection wells (WDW-138 and WDW-73) for the continued subsurface disposal of onsite contaminated storm water and groundwater during the ongoing Superfund Remedial Action (RA). The 2009 ROD identified the use of hazardous waste injection as a component of the RA. The purpose of this ESD is to address continued compliance with the substantive requirements of the land disposal restrictions of the Resource Conservation and Recovery Act (RCRA), which is an applicable or relevant and appropriate requirements (ARARs) for hazardous waste injection. In order to comply with this ARAR, this ESD documents that the operation of the two hazardous waste injection wells meets the substantive requirements for a continued exemption to the RCRA land disposal restrictions for the period of time necessary to complete the remedy, conditioned upon compliance with the operating parameters in this ESD. This ESD also documents that the substantive requirements of the Class I injection well permits and Underground Injection Control (UIC) regulations should continue to be met.

Both wells will be used during RA construction for disposal of storm water and contaminated water generated during RA construction activities which are estimated to be completed by January 2017. Following RA construction completion, one (1) injection well will continue to be used for disposal of leachate from the RCRA Subtitle "C" equivalent cell (e.g., landfill) until the initial large volumes of leachate are removed from the cell and the later minimal volumes can be disposed efficiently at an off-site facility by January 2019.

The two onsite injection wells were originally operated by the Malone Service Company pursuant to an approved EPA UIC No-Migration Petition and state UIC permits. The WDW-73 permit was issued in 1970, and the permit for WDW-138 in 1977. The State of Texas subsequently filed suit against the Malone Service Company alleging improper waste disposal and waste permit violations, and the Texas Department of Water Resources (presently the Texas

Commission on Environmental Quality [TCEQ]) UIC permits were revoked in May 1997. One of the wells was used subsequently for storm water disposal by EPA and the Malone Cooperating Parties, first under CERCLA removal authority, and then pursuant to the ROD.

At the time the ROD was signed, the requirements of the RCRA land disposal restrictions were addressed by the approved No-Migration Petition, but on June 16, 2015, this approval expired. On June 15, 2015, the Malone Cooperating Parties (MCP), the parties conducting the RA pursuant to a judicial consent decree, submitted an application for the continued operation of the two deep injection wells. The 2015 HWDIR [Hazardous Waste Disposal Injection Restrictions] Exemption Petition Reissuance Request (Petition Reissuance Request) contains the type of information that would support a typical no-migration exemption renewal petition, including data and analysis to demonstrate that continued injection at the Site will be protective of human health and the environment. Following the expiration of the 1990 Petition approval, there has been no existing no-migration exemption, and injection of storm water, except in emergency situations caused by heavy rainfall, ceased.

This ESD documents that the substantive requirements for a continued exemption to the RCRA land disposal restrictions have been met for operations of the two onsite injection wells to dispose of onsite contaminated water during the ongoing CERCLA RA. Use of the injection wells for disposal is conditioned upon compliance with the following injection well operating parameters, which are based on the conditions in the 1990 EPA approval of the No-Migration Petition and the state UIC permits. Operating parameters are:

- Injection Interval:
 - WDW-73: 4,912 to 4,995 feet
 - WDW-138: 4,162 to 4,323 feet
- Petition Injected Volume Limit:
 - WDW-73: 3,285,000 gallons/month (equates to 75 gals/min over 30.4 days)
 - WDW-138: 4,380,000 gallons/month (equates to 100 gals/min over 30.4 days)
- Specific gravity range: 1.0 to 1.07 inclusive for the petition
- Injection of hazardous waste is limited to the approved EPA hazardous waste codes listed in Appendix 1 to this ESD
- pH: not less than 4.5 nor greater than 12.0
- Maximum rate of injection: 200 gallons/minute subject to the monthly petition injected volume limit above
- Annulus pressure that is a minimum of 100 psi greater than the injection pressure at all times

WDW-138 specific:

- Operating surface injection pressure: maximum 1100 psig

WDW-73 specific:

- Operating surface injection pressure: maximum 1300 psig

Operations of the Injection Wells must follow all Mechanical Integrity Testing Requirements:

Annual Requirements:

- Annulus Pressure Test
- Radioactive Tracer Survey
- Pressure Falloff Test

Every Five Years Requirement:

- Temperature/Noise/or other approved log

If tubing is pulled:

- Casing Inspection Log

All substantive requirements of the UIC regulations applicable to use of the waste injection wells at the Site also must be met. Annual testing requirements will be coordinated with TCEQ. These operations will be conducted in accordance with the approved Storm Water Management Plan (SWMP) [ENTACT 2014], and any EPA approved addendums or revisions to the approved SWMP. After remedy construction is complete in January 2017, one injection well will be used for disposal of RCRA Subtitle C cell leachate until EPA determines that other methods become more efficient by January 2019. After use of the injection wells as part of the Site remedy has ceased, the wells will be plugged and abandoned pursuant to the substantive requirements of the applicable UIC regulations. The ESD is consistent with the remedial goals as defined in the ROD; will be more efficient and cost effective by managing the large volume of contaminated water through deep well injection, which will allow the ongoing RA to move forward expeditiously; and will maintain the intended scope, performance and integrity of the remedy.

III. SITE HISTORY AND CONTAMINATION

Site History

The Malone Service Company (MSC) facility is located within a marsh along the West bank of Galveston Bay, between Texas City and Galveston, Texas, and is approximately 1.5 miles from a public highway. The MSC began operating the Site in 1964 as a reclamation plant and disposal facility for waste oils and chemicals. Six storage and disposal pits, reclaiming tanks, and a burning pit were permitted. The facility was permitted to dispose of liquid hazardous and non-hazardous waste by means of two (2) deep injection wells. The MSC facility was permitted as a commercial storage, processing, and disposal facility authorized to store and process industrial waste under a Texas Department of Water Resources (predecessor agency of TCEQ) Hazardous Waste permit on September 14, 1984.

MSC received a variety of waste products from surrounding industries, including acids and caustics; contaminated residues and solvents; spent drilling fluids; acids containing heavy metals, inorganic slurries, gasoline and crude oil tank bottoms; contaminated earth and water from chemical spill cleanups; general industrial plant wastes; phenolic tars; and waste oils. The Remedial Investigation (RI) Report documented that the Contaminants of Concern (COCs) at the Site include metals, Semi-volatile Organic Compounds (SVOCs), Volatile Organic Compounds (VOCs), as well as dioxin and polychlorinated biphenyl (PCBs). During MSC operations, waste materials (i.e., oily sludge) accumulated in the Earthen Impoundment, API separators, and tanks.

Suit was filed against the MSC by the State of Texas due to improper waste disposal and waste permit violations. A jury found that MSC seriously violated its permits by illegally disposing of waste into an earthen pit at the facility on 418 occasions, and illegally discharging or causing seepage of waste from the pit on 3,495 occasions. Judgment was entered against MSC on August 14, 1989. The case went up to the Texas Supreme Court, which ruled in favor of the State and upheld the judgment. The judgment became final in 1993. In 1995, the Texas Natural Resource Conservation Commission (predecessor to TCEQ) filed an application for revocation of MSC's hazardous waste storage and injection well permits. After a hearing, requested by MSC, the

permits were revoked on May 6, 1997. In January 1996, prior to the final Order revoking the permits, all waste shipments to the Site ceased. The MSC Site was proposed for placement on the National Priorities List (NPL) on August 24, 2000; the Final NPL Listing was effective on July 16, 2001.

When EPA began an emergency removal action under CERCLA in 2000, it rehabilitated WDW-138 (WDW-73 was deemed inoperable) to dispose of storm water accumulating in surface impoundments and tank containment areas at the facility. On September 29, 2003, EPA entered into an Administrative Order on Consent (Order No. 06-18-03) with the MCP to conduct the Site Remedial Investigation and Feasibility Study (FS). The MCP assumed storm water management activities at the Site from the EPA in 2004. Use of injection well WDW-138 for storm water disposal continued after entry of the judicially approved consent decree between the EPA and the MCP for performance of the Site Remedial Design and Remedial Action (U.S. and State of Texas v. Alcoa, Inc., et al., Civ. Action No. 3:12-cv-00210, S.D. Tex.). The deep well injection performed by the MCP has been conducted pursuant to work plans approved by EPA, including the SWMP describing the Site water management strategy and methods.

In November 2007, the MCP reached a court-approved settlement agreement with the former Site owner, and Land Navigator Ltd assumed ownership of the property on behalf of the MCP. The court-approved settlement enables the MCP to impose on the property an institutional control prohibiting residential, commercial, and industrial development. The settlement further requires that the land be used in the future only to complete the response action and for purposes not inconsistent with final use as a natural preservation or conservation area.

Injection Wells

The MSC facility was permitted by the State of Texas to dispose of liquid hazardous waste by means of deep well injection and for the discharge of non-contaminated storm water runoff. MSC operated two Class I injection wells, WDW-138 and WDW-73. Class I wells are used to inject hazardous waste, beneath the lowermost formation containing, within one quarter mile, an underground source of drinking water. WDW-73 was originally permitted in 1970, and WDW-138 was originally permitted in 1977. The State of Texas revoked the facility permits on May 6, 1997, due to repeated permit violations.

On September 28, 1990, EPA approved the MSC's No-Migration Petition for an exemption to the land disposal restrictions imposed by the Hazardous and Solid Waste Amendments of 1984 to RCRA. The approval letter determined that the MSC petition met the requirements of 40 CFR Part 148 demonstrating no migration of hazardous constituents from the injection zone for 10,000 years. The approval contains conditions for the land disposal exemption.

Injection well WDW-138 is located in the northeast corner of the plant process area and was part of the Unit 1100 waste disposal area. Wastewater was injected for disposal into the Miocene Sands at a subsurface interval between 4,162 and 4,323 feet. A concrete-lined 2,200-gallon capacity sump was located directly east of the wellhead. Two wastewater tanks, Tanks 1102 and 1103, stored wastewater prior to injection. The tanks were located on the Unit 1100 concrete pad, which was surrounded by a 3-foot-high concrete wall. The concrete pad drained to the Unit 1100 sump.

Injection well WDW-73 is part of the Unit 700 area. This well was the facility's primary injection well, disposing of most of the wastewater treated at the plant. Filtered wastewater was injected for disposal at a subsurface interval of 4,912 to 4,995 feet in the Miocene Sands. The

well unit contained a concrete-lined transfer sump at Tank 700. The sump collected spilled material during transfers in and out of Tank 700. The capacity of the sump was approximately 100 gallons. Five storage tanks were associated with the unit (tanks 700, 704, 705, 709 and 710). This injection well became inoperable due to a tubing leak; however, the MCP conducted a well workover in 2014 in order to use this well in addition to WDW-138 to manage the large volume of storm water anticipated during the Phase-Two RA activities.

During RA activities, all contaminated water is directed to American Petroleum Institute (API) 100 for settling of sediment, then transferred through a pre-treatment system to adjust pH and drop out solid fines. The water is then directed to API 1200, through 1 micron filters, then pumped down injection well WDW-138 and WDW-73. If the API 100 requires water to be extracted, and the API 1200 has reached capacity, the API 100 water is transferred into the recently constructed temporary impoundment, then moved through the same series of steps.

The Site is enclosed by an 18-foot-high storm surge levee; all precipitation which falls on the Site is collected in hazardous waste management units or in Site drainage ditches. Water within hazardous waste units is pumped to the injection well for disposal; all remaining storm water is redirected by the drainage ditches to a sump, and is discharged to Galveston Bay if storm water samples meet the SWMP parameters.

Contamination

The primary identified sources of contamination at the Site are oily sludge located in the Earthen Impoundment, the Unit 100 API Separator, the Unit 1200 API Separator, and aboveground storage tanks. The average estimate for the total sludge volume is approximately 260,000 cubic yards. The other sources of oily sludge are buried pits and source material which has migrated into subsurface soils.

Secondary sources of contamination are contaminated soils, which exist due to general Site operations, such as spills from stockpiling of materials and equipment, and construction of shallow pits used for burning or short-term storage. Leaching to groundwater is a potential secondary release mechanism from the contaminated soils. VOCs may partition into the vapor phase from the dissolved-phase groundwater. Class 3 (non-potable) groundwater contaminant concentrations appear to be relatively minor but constant, with the groundwater plume remaining near the specific source areas.

The COCs at the Site are toxic, mobile, carcinogenic, and non-carcinogenic. Metals concentrations, such as antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, thallium, vanadium, and zinc, exceeded Quality Assurance Project Plan screening criteria for soil in at least one source sample. The SVOCs detected in the source areas (sludge) include Polycyclic Aromatic Hydrocarbons (PAHs), phenolic compounds, and phthalate esters. VOCs detected in the impoundments, separators, and tanks include the aromatic and chlorinated hydrocarbons.

IV. SELECTED REMEDY

The Record of Decision (ROD) was signed on September 30, 2009. The ROD selected a remedy that would (1) reduce risks to human health and ecological receptors from the Site sludge (the principal threat waste/source material) and contaminated soils by solidifying the sludge and placing the solidified material, as well as un-solidified contaminated soils, in an on-site RCRA Subtitle "C" equivalent cell; and (2) monitor groundwater for degradation of chemical

constituents and to detect and mitigate any off-site migration of groundwater above the TCEQ Class 3 (non-potable) Groundwater Protective Concentration Levels (30 Texas Administrative Code [TAC], Chapter 350, Subchapter D) for commercial/industrial settings, and prevent exposure to contaminated groundwater onsite through institutional controls.

The Site is presently owned by Land Navigator Ltd subject to control by the Principal Settling Defendants acting as and through members of the MCP. The ROD states that the basis for the sludge and contaminated soil RA Levels is to remediate media to on-site conservancy worker and ecological remediation levels to maintain and allow for future land use as a preserve or conservancy (ROD Section 2.8.2 and 2.12.4). The RA will remediate the Site to levels appropriate for reuse as a preserve or conservancy (ROD Section 2.4).

The Malone ROD identified the two deep injection wells and described the prior use of WDW-138 for disposal of storm water. The ROD provided that a common element of all active remedial alternatives would be disposal of groundwater extracted from within the barrier to be constructed around the Site Sludge Pit through injection into the on-site operating Class I injection well, as well as providing for the continuing injection of aqueous liquids such as water remaining in tanks and contact storm water. The 2009 ROD states (Section 2.9.3, Common Elements), "[t]he injection well system for disposal of aqueous wastes during the remedial action has high long-term effectiveness. Injecting aqueous liquids, such as water remaining in tanks, contact (contaminated) storm water, or groundwater, into the on-site deep hazardous waste well reduces the volume of wastes and meets the remedial action objectives (RAOs) for liquid wastes. Injection shall follow the Storm Water Management Plan requirements. All wells will be plugged and abandoned following agency Underground Injection Control requirements after completion of the remedial action."

Although the permits for the injection wells were revoked in 1997, the ROD properly provided for use of the injection wells for on-site disposal of contaminated Site storm water and groundwater as part of the CERCLA RA. Under Section 121(e)(1) of CERCLA, no Federal, State, or local permits are required for the portion of any removal or remedial action conducted entirely on-site. Underground injection of contact storm water and other remediation-related water is conducted entirely on-site, so that, even though the former permits were revoked, no new permit for the Superfund response action is necessary.

The ROD identified as applicable or relevant and appropriate requirements (ARARs) the UIC regulations regarding injection of wastes into hazardous waste injection wells. As stated on page 2-67 of the ROD, "[c]ontaminated aqueous phase materials would be injected in the on-site deep hazardous waste injection well in accordance with the current usage of the well, as well as applicable Underground Injection Control requirements for injection of wastes into the on-site hazardous waste injection well." The ROD further provided that all wells would be plugged and abandoned following UIC requirements after completion of the Remedial Action. At the time the ROD was signed, RCRA land disposal restrictions, also an ARAR for operation of the hazardous waste injection wells, were addressed by the approved No-Migration Petition, but on June 16, 2015, this approval expired.

The ROD requires approximately 260,000 cubic yards of oily sludge to be solidified and placed in an onsite RCRA Subtitle "C" equivalent cell and excavation and backfill of approximately 100,000 cubic yards of affected/contaminated soils. Prior to RA construction activities, contaminated storm water accumulated in solid waste management units totaling approximately 5.5 acres (approximately 298,000 gallons of storm water generated for a two-inch rain event);

storm water has been removed and injected into the UIC well WDW-138 to maintain freeboard to prevent overflow of contaminated water from the units. However, during RA construction approximately seven (7) times more contaminated storm water volume (37 acres; approximately 2,000,000 gallons generated for a two-inch rain event) will need to be managed.

The RA construction activities follow a three (3) phase design-build approach. Phase-One was the preliminary Site preparations for the full-scale Phase-Two and Three construction activities. Phase-One activities, which began in April 2014, only required continued management of storm water that accumulated in existing solid waste management units and was injected into WDW-138 to maintain freeboard. However, during Phase-Two RA activities, which began in April 2015, storm water will also accumulate in excavated areas, solidification areas and the RCRA Subtitle C cell (approximately 37 acres). In addition, construction of the RCRA cell will require disposal of groundwater from dewatering activities and leachate from the completed cell.

V. BASIS FOR THE DOCUMENT

The purpose of this ESD is to modify the scope of the remedy by allowing the continued use of the two (2) onsite hazardous waste injection wells to dispose of contaminated storm water and groundwater during Superfund RA activities. The operations of the hazardous waste injection wells were exempt from the RCRA land disposal restrictions under the authority of the 1990 EPA approval of UIC No-Migration Petition, until its expiration in June 2015. This ESD allows for the continued use of the onsite hazardous waste injection wells throughout Superfund RA activities pursuant to CERCLA, by documenting that the substantive requirements for continued exemption from the RCRA land disposal restrictions have been met. All the substantive conditions of the 1990 EPA approval of the No-Migration Petition as well as the TCEQ UIC Permits will be followed, as set forth in the operating parameters listed in this ESD. As discussed below, hazardous waste injection at the Site also must comply with the substantive requirements of the UIC regulations that are ARARs for this action. Only the continued use of the hazardous waste injection wells is addressed by this modification; all other ROD requirements remain unchanged. This ESD for the Site is consistent with the remedy as defined in the ROD by clarifying the ROD's intent for use of subsurface injection to dispose of contaminated water during Superfund RA activities.

The land disposal restrictions imposed by the Hazardous and Solid Waste Amendments of 1984 to the RCRA are ARARs for the injection of hazardous waste as part of the Site remedy. The land disposal restrictions prohibit the injection of hazardous waste unless a petitioner can demonstrate to the EPA, to a reasonable degree of certainty, that there will be no migration of hazardous constituents from the injection zone for as long as the wastes remain hazardous. The land disposal restrictions for injection wells, codified in 40 CFR Part 148, provide the standards and procedures by which petitions to dispose of an otherwise prohibited waste by injection will be reviewed and by which exemptions pursuant to these petitions will be granted or denied. Subsection 148.20(a)(1)(i) of the regulations provides that such a demonstration may be made on the basis of a scientific analysis showing that the injected fluids will not migrate vertically upward out of the injection zone or laterally within the injection zone to a point of discharge or interface with an Underground Source of Drinking Water (USDW) within 10,000 years.

In 1990, EPA approved the MSC's No-Migration Petition for an exemption to the RCRA land disposal restrictions. The approval letter contained EPA's determination that the MSC petition met the requirements of 40 CFR Part 148 demonstrating no migration of hazardous constituents from the injection zone for 10,000 years. The approval contained Petition Approval Conditions,

including limitations on injection intervals, monthly injected volumes, characteristics of injected waste streams, hazardous wastes to be injected, and requirements for bottom hole pressure surveys.

The Petition Reissuance Request submitted by the MCP in 2015 provides test results to show that both injection wells WDW-138 and WDW-73 continue to meet the substantive requirements of 40 CFR Part 148. Both wells can be operated at original petition conditions for remediation purposes without causing any potential USDW endangerment concerns or migration of hazardous waste from the original approved injection intervals. The Petition Reissuance Request contains data to demonstrate the mechanical integrity of both wells in compliance with 40 CFR Section 148.20(a)(2)(iv). The MCP rehabilitated injection well WDW-73 in 2014, and also performed a remedial well workover on WDW-138. Due to bottomhole well construction issues, which allowed only minimal injection rates into WDW-138 and no injection into WDW-73, the MCP conducted major repairs to packers, tubing and casing on each well to rehabilitate the wells to accept the approved injection rate. In addition, the repairs required acidizing and flushing to increase the injection rate for the needed disposal capacity during RA construction activities. Both wells were tested for mechanical integrity after the repairs were completed, as summarized below. The Petition Reissuance Request also presents information on the depth of the lower most underground source of drinking water, the artificial penetrations within a 2.5-mile radius of the injection well, pressure buildup information due to injection and other information as outlined below.

The MCP completed the Petition Reissuance Request and submitted it to EPA Region 6 UIC Section just before the original petition's expiration date. The Petition Reissuance Request seeks modifications in the operating conditions for the two injection wells, such as changes in the injection intervals for both wells, and also requests an extension to operate the wells until 2030. These requested modifications have not been adopted as part of this ESD.

The Petition reissuance was used to ensure that if the wells were operated in compliance with the 1990 approved petition compliance conditions, that both wells can be operated at original petition conditions for remediation purposes without causing any potential USDW endangerment concerns or migration of hazardous waste from the original approved injection intervals.

Hydrogeology

According to 40 CFR §148.20(a), a petitioner must submit hydrogeological information in order to study the effects of the injection well activity. The MCP provided hydrogeological information in the Petition Reissuance Request to demonstrate that USDWs are protected from pressure endangerment. The base of the lowermost USDW is at 1,450' log depth in injection well number WDW-73.

Artificial Penetrations

The MCP submitted information on all artificial penetrations (wells) which penetrate the injection or confining zones within the area of review (area within a 2 mile radius of the injection well - 40 CFR §146.63) and the 10,000 year waste plume boundary. The MCP addressed all wells within 2.5 miles from the injection wells to be consistent with the TCEQ UIC permit required area of review. All of these wells were evaluated, and they are either plugged or constructed so that any waste migration due to pressure or molecular diffusion in an artificial

penetration would remain within the injection zone given the maximum pressures in the Upper and Lower Injection Intervals. [40 CFR §§148.20(a)(1)(i)-(ii)&(2)(i)-(iii)]

Mechanical Integrity Testing (MIT) Information

To assure that the wastes will reach the injection interval, a petitioner must submit the results of pressure and radioactive tracer tests, according to 40 CFR §148.20(a)(2)(iv). These tests demonstrate mechanical integrity of a well's long string casing, injection tubing, annular seal, and bottomhole cement. The tests confirm that all injected fluids are entering the approved injection interval and that no fluids are channeling up the wellbore out of the injection zone. The Petition Reissuance Request demonstrates that the following wells were tested and satisfy the above criteria:

Well Number	Annulus Pressure Test	Radioactive Tracer Survey
WDW-073	July 23, 2015	July 23, 2015
WDW-138	August 21, 2015	August 21, 2015

Regional and Local Geology

Class I hazardous waste injection wells must be located in areas that are geologically suitable. The injection zone must have sufficient permeability, porosity, thickness, and areal extent to prevent migration of fluids into USDWs. The confining zone must be laterally continuous and free of transmissive faults or fractures to prevent the movement of fluids into a USDW and must contain at least one formation capable of preventing vertical propagation of fractures. The Malone Superfund Site is located in an area meeting the above criteria.

An evaluation of the structural and stratigraphic geology of the local and regional area determined that the Site is located at a geologically suitable site. The injection zone is of sufficient permeability, porosity, thickness, and areal extent to meet requirements stated in 40 CFR Part 148. The confining zone is laterally continuous and free of transecting, transmissive faults or fractures over an area sufficient to prevent the movement of fluids into a USDW.

The geologic conditions for the Site were presented through a discussion of the depositional environments, well logs, cross-sections, well tests, and geologic maps. The geologic cross-sections demonstrated the lateral relationships of the injection and confining zones. Well injectivity and falloff tests support the injection zone permeability values used in the modeling strategies.

The depths to the geologic zones measured from the Kelly Bushing are as follows:

<u>Well Number</u>	<u>Confining Zone</u>	<u>Injection Zone</u>	<u>Injection Intervals</u>	
			<u>Upper</u>	<u>Lower</u>
WDW073	1888 - 3336	3336 - 4995		4912 - 4,995

WIDW138	1896 - 3382	3382 - 4950	4,162 - 4323	
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Modeling Strategy

According to 40 CFR §148.21(a)(3), in demonstrating no migration of hazardous constituents from the injection zone, predictive models shall have been verified and validated, shall be appropriate for the specific site and waste streams, and shall be calibrated for existing sites. The modeling strategy consisted of analytical models. The models used were identified as being verified and validated according to the information submitted in the Petition. This information consists of actual model documentation or references of methods or techniques that are widely accepted by the technical community. The Petition describes the predictive models used and demonstrated that the above criteria are met. According to 40 CFR §148.21(a)(5), reasonably conservative values shall be used whenever values taken from the literature or estimated on the basis of known information are used instead of site-specific measurements. Many variables were required to be quantified in order to employ the models used in the Petition. All parameters were conservatively assigned to produce worst case scenarios for pressure buildup and waste movement.

According to 40 CFR §148.21(a)(6), a petitioner must perform a sensitivity analysis in order to determine the effect of uncertainties associated with model parameters. The Petition provided this sensitivity analysis. Through conservative model parameter assignments within this analysis, worst case scenarios for pressure buildup and waste movement were investigated and reported.

Timeframes were incorporated to complete the modeling demonstration. The operational period was modeled to demonstrate the maximum pressure buildup while the 10,000 year post injection period was modeled to predict maximum molecular diffusion and horizontal drift of the waste plumes. [Note - While the MCP requested an extension of well operations through 2030, this ESD authorizes operations only through RA completion, which is approximately 1.5-2 years after RA construction completion.]

The Petition referred to site specific data acquired during the drilling of the wells, well tests and mechanical integrity tests, and applicable literature to select the values used in the no migration demonstrations. Appropriate net thicknesses were utilized in both the pressure buildup and plume migration demonstrations. A range was assigned to some parameters to maximize their impact on the demonstration. The pressure buildup demonstrations included the effects of area faulting in both injection sands to maximize pressure buildup effects.

EPA will continue to receive an annual pressure fall-off test conducted on each injection well. The pressures obtained from these tests are reviewed by EPA and compared to the pressures predicted by the model for a no migration demonstration.

The 10,000 year low density lateral plume models assumed no background gradient to maximize waste plume movement in the up dip direction. The maximum lateral movement of waste is determined by the volume injected, not the timeframe in which the injection occurs. Therefore, the length of the operational period does not impact the lateral plume modeling for either the Upper or Lower Injection Intervals. A vertical diffusion demonstration was included in the Petition that calculated the maximum vertical movement into intact strata and a mud-filled wellbore. The models (10,000 year plume and diffusion) demonstrated that the injected waste will not migrate vertically upward out of the injection zone or laterally within the injection zones

to a point of discharge or interface with a USDW.

EPA Conclusions

- Both wells have significantly lower historical cumulative injected volumes in the two injection intervals, as reported in the 2015 reissuance document, compared to the worst case total projected volumes from the original petition modeling demonstrations. For WDW-73, only approximately 39% of the 1990 petition total modeled volume has actually been injected into the lower interval, while for WDW-138 only approximately 22% of the 1990 petition total modeled volume has been injected into the upper interval.
- Historical static pressure data from 1994 to 2015 indicate little or no pressure buildup in either injection interval.
- The most recent falloff test for WDW-138, performed in April 2015, indicates a much higher transmissibility in its injection interval than was originally modeled in the petition which would indicate less projected pressure buildup using original petition worst case injection conditions.
- The most recent falloff test for WDW-73, performed in July 2015, indicates a much higher transmissibility in its injection interval than was originally modeled in the petition which would indicate less projected pressure buildup using original petition worst case injection conditions.
- Using worst case projected conditions from the original petition, a review of all artificial penetrations (APs) provided from the new 2015 reissuance within the areas of original cones of pressure influence for the two injection intervals indicates that all APs are either not deep enough or properly plugged or constructed to withstand pressure buildup effects.
- Both wells can be operated at original petition conditions for the Remedial Action period only, with one well to address Subtitle "C: Cell leachate for an EPA approved period without causing any potential USDW endangerment concerns or migration of hazardous waste from the original approved injection intervals.

Quality Assurance

According to 40 CFR §148.21(a)(4), the MCP must demonstrate that proper quality assurance and quality control plans were followed in preparing the petition demonstrations. Specifically, the MCP followed appropriate protocol in identifying and locating records for artificial penetrations within the area of review (AOR). Information regarding the geology, waste characterization [40 CFR §148.21(a)(1)], hydrogeology, reservoir modeling, and well construction has also been adequately verified or bounded by worst-case scenarios.

Geochemistry and Injected Waste Compatibility

According to 40 CFR §148.21(b)(5), a petitioner must describe the geochemical conditions of the well site. The physical and chemical characteristics of the injection zone and the formation fluids in the injection zone were described in the Petition Reissuance Request. This description included a discussion of the compatibility of the injected waste with the injection zone.

Characteristics of Injected Fluids

According to 40 CFR §148.22(a), the characteristics of the injection waste stream must be adequately described. These characteristics are described in the Petition Reissuance Request.

Only a small percentage of the waste volume approved for injection in 1990 has been injected. For WDW-73, approximately 39% of the 1990 petition total modeled volume has actually been injected into the lower interval, while for WDW-138 approximately 22% of the 1990 petition total modeled volume has been injected into the upper interval. A review of the 1990 approved No-Migration Petition, as well as certain information presented in the Petition Reissuance Request, is sufficient to demonstrate that both injection wells WDW-138 and WDW-73 continue to meet the substantive requirements for an exemption from the RCRA land disposal restrictions until completion of the RA, by demonstrating no migration of hazardous constituents from the injection zone for 10,000 years. This exemption from the land disposal restrictions is contingent upon compliance with the operating parameters in this ESD, which are based on the 1990 approved no migration petition compliance conditions and the former TCEQ UIC permit conditions.

During RA construction activities, contaminated storm water and groundwater (in support of sludge dewatering activities) will be injected using the injection wells pursuant to the approved SWMP. The ROD requires plugging of all wells at the completion of the RA; however, during cell construction, precipitation will infiltrate the solidified material and migrate down to the leachate collection system; this large volume of water will need to be removed and disposed of down one of the hazardous waste injection wells. Therefore, following RA Construction Completion, one (1) injection well will be plugged and abandoned, and one (1) injection well will be used for RCRA cell leachate disposal until EPA determines that other methods have become more efficient, which is estimated to be approximately 1.5-2 years. Following that period, this well also will be plugged and abandoned following EPA requirements.

VI. DESCRIPTION OF THE SIGNIFICANT DIFFERENCES AND THE BASIS FOR THOSE DIFFERENCES

Scope

The purpose of the ESD is to clarify the requirements for continued use of the onsite hazardous waste injection well throughout the RA activities. The 1990 EPA UIC No-Migration Petition expired on June 16, 2015. Since June 17, 2015, there has been no existing no-migration exemption; therefore, all injection operations relative to the ongoing RA activities have ceased, with the exception of emergency operations pursuant to CERCLA removal authority, because the previous injection operated under the authority of the expired EPA UIC No-Migration Petition. Without the use of hazardous waste injection, RA activities also will cease due to the large volume of contaminated water requiring management, and the MCP's contractors will demobilize from the Site until a more efficient/effective water management method can be identified and implemented. Continued use of the injection wells to manage contaminated water generated during the ongoing RA activities is necessary. This ESD will be the substantive equivalent, pursuant to CERCLA, of an extension of the approval of the No-Migration Petition, based on its determination that there will be no migration of hazardous constituents from the injection zone for 10,000 years as a result of injection well disposal conducted as part of the CERCLA response action.

The remedy modification (i.e., the ESD) for the Site is consistent with the remedial goals as defined in the September 30, 2009, ROD. The continued use of the injection wells during the RA will be more efficient, more cost effective, and will maintain the intended scope, performance and integrity of the remedy. This ESD will not change the type of treatment, physical area of

response, remedial goals to achieve, or type and volume of waste to be addressed.

Performance

The performance of the remedy will not change due to this ESD; treatment levels and long-term reliability of the remedy remain requirements of the ROD. The ROD requires the solidification of site sludge and placement of the solidified material and unsolidified affected soil in an on-site Subtitle "C" equivalent cell. Injection of extracted groundwater from below the six-acre Earthen Impoundment decreases the influx of groundwater into the impoundment, which improves the overall solidification process. Injection of contaminated storm water decreases the need for large temporary impoundments, which would need to be located in uncontaminated areas. Based on this performance criterion, continued use of the injection wells during RA activities is warranted. The use of injection wells is to support the primary RA components.

Integrity

Continued use of the injection wells does not change the integrity of the remedy. The wells are only used to manage contaminated storm water and groundwater during RA activities and to prevent releases. The use of the injection wells is to support the remedy by managing storm water and groundwater during the RA and preserves the integrity of the remedy. Considering that injection well WDW-138 has been used under EPA authority since 1999 to address uncontrolled discharge of contaminated water from onsite hazardous waste management units, the ESD does not change the integrity of the remedy.

Costs

The modification which prompted this ESD does affect the cost of the overall RA response. Use of the injection wells has a lower cost for the RA period relative to the use and disposal of other material such as granular activated carbon (GAC). The use of GAC would require a vast amount of carbon to address even a minor rain event during RA activities; several treatment trains would need to be used. Considering the injection wells onsite and the RA operational area, additional uncontaminated areas would need to be used for GAC operations.

VII. SUPPORT AGENCY COMMENTS

The TCEQ was provided a draft copy of this ESD for review and comment in accordance with NCP §§ 300.435(c)(2)(i) and CERCLA § 121(f). All of the TCEQ's comments have been addressed.

VIII. STATUTORY DETERMINATIONS

After consideration of the continued use of the two (2) onsite hazardous waste injection wells to manage the large volume of contaminated storm water and groundwater anticipated during the RA activities, EPA Region 6, has determined that the continued use of the injection wells for the CERCLA remedy, which is described in this ESD, is appropriate if conducted in accordance with the provisions of this ESD, which are based on the 1990 approved no migration petition compliance conditions and the former TCEQ UIC permit conditions. The EPA believes that the remedy remains protective of human health and the environment. EPA has determined that the modification to the ROD provided in this ESD is significant but does not fundamentally alter the overall remedy for the Site with respect to the scope or performance and is cost effective. It complies with the statutory requirements of CERCLA § 121, 42 U.S.C. § 9621 and other Federal and State requirements that are applicable or relevant and appropriate to this remedial action.

Although the ROD is being modified by this ESD, it is only to clarify the authority for the remedy component of hazardous waste injection and the requirements for use of the deep injection wells on-site as part of the RA. This ESD does not otherwise alter the remedy selected in the ROD signed on September 30, 2009.

Action Specific ARARs:

The regulations for management of solid hazardous wastes and underground injection of hazardous liquids (40 CFR Parts 144, 146 and 148; 30 TAC Chapter 331 are applicable to this action; the on-site hazardous waste injection wells are being used for disposal of liquids in waste management units and will be used during the RA to dispose of hazardous liquids generated during the response. Underground injection wells on a Superfund site are not required to comply with the administrative requirements of the UIC regulations; however, they must meet the substantive requirements of the UIC program where the requirements are determined to be an ARAR. Substantive UIC requirements that are CERCLA ARARs for the on-site injection wells include well construction requirements, well operating requirements, well monitoring requirements, and closure requirements for Class I wells. These substantive requirements include the use of noncorrosive or inhibited annulus fluids and restriction of injection pressure below fracture pressure; analysis of the injected fluids; installation and use of continuous recording devices to monitor injection pressure, flow rate and volume, and pressure on the annulus; and a demonstration of mechanical integrity annually. Operation of the hazardous waste injection wells at the Site must meet these substantive requirements of the UIC regulations, as well as the specific substantive requirements of the UIC permits.

The RCRA land disposal restriction are also applicable to hazardous waste injection, but this ESD documents that the substantive requirements for an exemption to the land disposal restrictions have been met. Requirements for owner operators of hazardous waste facilities are at 40 CFR 264 and 761. The State's 30 TAC 307.4 and 307.6 may be also applicable to the extent that surface water is discharged from the Site during the remedial action or after completion of the remedy. EPA's 40 CFR 122 and 445, and State's 30 TAC 319.22 address the discharge of water from the Site.

IX. PUBLIC PARTICIPATION ACTIVITIES

This ESD and the documents supporting this decision will become part of the Administrative Record file (NCP 300.435(a)(2)), which has been developed in accordance with Section 113 (k) of CERCLA, 42 U.S.C. § 9613 (k), which is available to the public for inspection and copying in the information repositories listed below. In addition, as required by NCP § 300.435(c)(2)(i), a notice of availability and a brief description of this ESD, which briefly summarizes this ESD, including the reasons for the differences, will be published in a major local newspaper of general circulation at or near the Site.

This ESD is effective on January 19, 2016, and will expire on January 19, 2019, unless EPA receives adverse comments by January 14, 2016. If adverse comments are received, the EPA will publish a timely withdrawal of the ESD in a major local newspaper of general circulation at or near the Site, informing the public that the ESD will not take effect. EPA will, as appropriate, prepare a response to comments and continue with the remedy modification process on the basis of the ESD and the comments already received. There will be no additional opportunity to comment.

EPA will hold a public meeting to explain the ESD and receive comments at:

Texas City Convention Center

2010 5th Avenue N.
Texas City, Texas 77590

The public is invited to comment on the ESD at this meeting. Written comments may be submitted before January 14, 2016 to:

Charles David Abshire
Remedial Project Manager
EPA Region 6 (6SF-RA)
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733
(214) 665-7188 or toll free 1(800) 533-3508
abshire.david@epa.gov

Documents related to the Site and to this ESD can be found at the following information repositories:

EPA Region 6

7th Floor Reception Area
1445 Ross Avenue, STE 12D13
Dallas, TX 75202-2733
Toll free: 1-800-533-3508 or (214) 665-6597
Monday – Friday, 7:30 – 11:00 a.m./1:00 – 4:00 p.m.

Texas Commission on Environmental Quality

Records Management Center
Technical Park Center Bldg. E., 1st Floor
12100 Park Circle
Austin, TX 78753
Toll free: 1-800 633-9363 or (512) 239-9363
Monday – Friday, 8:00 a.m. – 5:00 p.m.

Moore Memorial Public Library, Texas City

1701 9th Avenue N.
Texas City, TX 77590
(409) 643-5979
Monday – Wednesday, 9:00 a.m. – 9:00 p.m.
Thursday – Friday, 9:00 a.m. – 6:00 p.m.
Saturday, 10:00 a.m. – 4:00 p.m.

X. AUTHORIZING SIGNATURE

This ESD documents the significant changes related to the remedy at the Malone Service Company Superfund Site. These changes were selected by EPA with comments from the TCEQ.

U.S. Environmental Protection Agency


Carl E. Edlund, P.E.

Director, Superfund Division

12/10/15

Date

APPENDIX 1

EPA UIC Approved Waste Codes



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

September 21, 1994

CERTIFIED MAIL - P239 549 456 - RETURN RECEIPT REQUESTED

Mr. Tracy Hollister
President
Malone Service Company
P.O. Box 709
Texas City, TX 77592-0709

Re: Malone Service Company Nonsubstantive Revision Request

Dear Mr. Hollister:

We have reviewed the June 17, 1994, request for a nonsubstantive revision to add waste codes to the approved exemption to the land disposal restrictions for the hazardous waste injection wells operated by Malone Service Company (Malone) in Texas City, Texas. Since the requested waste codes contain waste constituents that were included in other waste codes in the original no migration demonstration, and Malone has demonstrated that the concentration reduction factor of 1×10^{-11} employed in the original petition demonstration remains valid, the addition of these new codes is considered a nonsubstantive revision. Therefore, I am amending Petition Approval Condition No. 5 of the final Malone petition decision dated September 28, 1990, to include the waste codes listed in Attachment 1.

Malone is restricted to a maximum wellhead concentration of 10,000 mg/l for each constituent except for the constituent Diethylstilbestrol (U089) which is restricted to a maximum wellhead concentration of 1,000 mg/l. The waste code F039 is approved for multi-source leachate which contains waste constituents that are approved in the exemption. If you have any questions, please contact Phil Dellinger at (214) 665-7142.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "Myron O. Knudson", is written over a horizontal line.

Myron O. Knudson, P.E.
Director
Water Management Division (6W)

Attachment

cc: Ben Knape, TNRCC

ATTACHMENT 1

Amendment to Petition Approval Condition No. 5 of the Malone petition approval dated September 28, 1990.

5. The maximum wellhead concentration will be restricted to 10,000 mg/l for each constituent except for the constituent Diethylstilbestrol (U089) which is restricted to a maximum wellhead concentration of 1,000 mg/l. The waste code F039, is approved for leachate which contains waste constituents in the approved Malone petition. The approval for injection is limited to the following hazardous waste codes:

D001	D036	K008	K044	K102	P009
D002	D037	K009	K045	K103	P010
D003	D038	K010	K046	K104	P011
D004	D039	K011	K047	K105	P012
D005	D040	K013	K048	K106	P013
D006	D041	K014	K049	K107	P014
D007	D042	K015	K050	K108	P015
D008	D043	K016	K051	K109	P016
D009	F001	K017	K052	K110	P017
D010	F002	K018	K060	K111	P018
D011	F003	K019	K061	K112	P020
D012	F004	K020	K062	K113	P021
D013	F005	K021	K064	K114	P022
D014	F006	K022	K065	K115	P023
D015	F007	K023	K066	K116	P024
D016	F008	K024	K069	K117	P026
D017	F009	K025	K071	K118	P027
D018	F010	K026	K073	K123	P028
D019	F011	K027	K083	K124	P029
D020	F012	K028	K084	K125	P030
D021	F019	K029	K085	K126	P031
D022	F024	K030	K086	K131	P033
D023	F025	K031	K087	K132	P034
D024	F027	K032	K088	K136	P036
D025	F035	K033	K090	K149	P037
D026	F037	K034	K091	K150	P038
D027	F038	K035	K093	K151	P039
D028	F039	K036	K094	P001	P040
D029	K001	K037	K095	P002	P041
D030	K002	K038	K096	P003	P042
D031	K003	K039	K097	P004	P043
D032	K004	K040	K098	P005	P044
D033	K005	K041	K099	P006	P045
D034	K006	K042	K100	P007	P046
D035	K007	K043	K101	P008	P047

ATTACHMENT 1 (continued)

P048	P110	U038	U090	U142	U192
P049	P111	U039	U091	U143	U193
P050	P112	U041	U092	U144	U194
P051	P113	U042	U093	U145	U196
P054	P114	U043	U094	U146	U197
P056	P115	U044	U095	U147	U200
P057	P116	U045	U096	U148	U201
P058	P118	U046	U097	U149	U202
P059	P119	U047	U098	U150	U203
P060	P120	U048	U099	U151	U204
P062	P121	U049	U101	U152	U205
P063	P122	U050	U102	U153	U206
P064	P123	U051	U103	U154	U207
P065	U001	U052	U105	U155	U208
P066	U002	U053	U106	U156	U209
P067	U003	U055	U107	U157	U210
P068	U004	U056	U108	U158	U211
P069	U005	U057	U109	U159	U213
P070	U006	U058	U110	U160	U214
P071	U007	U059	U111	U161	U215
P072	U008	U060	U112	U162	U216
P073	U009	U061	U113	U163	U217
P074	U010	U062	U114	U164	U218
P075	U011	U063	U115	U165	U219
P076	U012	U064	U116	U166	U220
P077	U014	U066	U117	U167	U221
P078	U015	U067	U118	U168	U222
P081	U016	U068	U119	U169	U223
P082	U017	U069	U120	U170	U225
P084	U018	U070	U121	U171	U226
P085	U019	U071	U122	U172	U227
P087	U020	U072	U123	U173	U228
P089	U021	U073	U124	U174	U234
P092	U022	U074	U125	U176	U235
P093	U023	U075	U126	U177	U236
P094	U024	U076	U127	U178	U237
P095	U025	U077	U128	U179	U238
P096	U026	U078	U129	U180	U239
P097	U027	U079	U130	U181	U240
P098	U028	U080	U131	U182	U243
P099	U029	U081	U132	U183	U244
P101	U030	U082	U133	U184	U246
P102	U031	U083	U134	U185	U247
P103	U032	U084	U135	U186	U248
P104	U033	U085	U136	U187	U249
P105	U034	U086	U137	U188	U328
P106	U035	U087	U138	U189	U353
P108	U036	U088	U140	U190	U359
P109	U037	U089	U141	U191	